

APPLIANCE FOR COOKING FOODS UNDER PRESSURE COMPRISING A
TEMPERATURE SENSOR

TECHNICAL FIELD

5 The present invention relates to the general
technical field of household appliances for cooking under
pressure, such an appliance comprising a bowl and a lid
designed to be locked onto the bowl to form a leaktight
cooking enclosure. Such an appliance serves to cook food
10 contained in the bowl under steam pressure.

 The present invention relates to an appliance for
cooking food under pressure, the appliance being of the
pressure cooker type and comprising: a bowl and a lid
designed to be mounted on the bowl to form a leaktight
15 cooking enclosure; a temperature sensor; and a pressure-
regulating valve that is sensitive to the pressure
prevailing inside the cooking enclosure and that is
mounted to move between two stable abutment positions,
namely a first position in which it shuts off
20 communication from the enclosure to the outside so long
as the internal pressure is lower than a predetermined
pressure P_0 , and a second position in which it puts the
inside of the enclosure into communication with the
outside via a steam outlet once the internal pressure
25 reaches substantially the predetermined pressure P_0 .

 The present invention also relates to a method of
monitoring a cooking cycle of a cooking appliance.

PRIOR ART

30 Attempts have already been made to obtain or
retrieve information relating to magnitudes or parameters
representative of the operating state of a pressure-
cooking appliance for the purpose of controlling
operation of said appliance or for monitoring operating
35 safety.

 Thus, it is already known that the cooking
temperature of a pressure cooker or its operating

pressure can be measured by means of sensors disposed inside the vessel itself, the information obtained serving to monitor the various cooking parameters of the appliance, such as the cooking time, the level of the cooking pressure, or the level of heat energy supplied for cooking the food. Such a method and such a device are described, for example, in Document GB-2 067 325.

It is also already known that a temperature sensor can be disposed on the lid of a pressure cooker in order to obtain an electrical signal, constituting an image of the cooking temperature, for the purpose of monitoring operation of the pressure cooker by means of an electronic processor device. The information obtained serves to give the user a series of visible or audible signals concerning the progress of a cooking cycle. Such a device is described in Patent Application FR-2 634 914.

Known devices are difficult to implement insofar as they require information to be gathered inside a leaktight enclosure, it then being necessary to transmit the information to a unit disposed outside the pressure cooker.

In addition, known devices also implement a series of electronic processor devices which are complex and often expensive.

It is also known that a timer can be used in association with a pressure cooker in order to monitor cooking time. In most cases, the timer is a unit that is separate from the appliance and that the user must start by taking positive action, since it is manually triggered.

In order to make such triggering automatic, it has already been proposed for such a timer to be started by the internal pressure of the cooking appliance being detected by means of a pressure sensor.

For the above-mentioned reasons, such a device is difficult to implement insofar as it requires information

to be gathered from inside a cooking enclosure that is supposed to be leaktight.

Finally, consideration has already been given to triggering such timers automatically by detecting the movement of a pressure indicator by means of a Hall-effect probe. Such a device is also difficult to implement, expensive, and relatively inaccurate.

SUMMARY OF THE INVENTION

Objects of the invention are thus to remedy the various drawbacks listed above, and to provide a novel food-cooking appliance provided with the means necessary to enable the beginning of a cooking cycle for cooking food inside the pressure cooker to be detected simply and reliably.

Another object of the invention is to provide a novel cooking appliance making it possible to give the user reliable information concerning the beginning of the cooking cycle.

Another object of the invention is to provide a novel cooking appliance in which the temperature sensor is particularly easy to position.

Another object of the invention is to provide a novel pressure-cooking appliance which has improved features and which enables the user to monitor the cooking cycle effectively.

Another object of the invention is to provide a novel pressure-cooking appliance whose general design is simplified.

Objects of the invention are also to provide a novel method of monitoring a cooking cycle of a cooking appliance, which method is particularly effective, while also procuring very considerable freedom for the user.

The objects of the invention are achieved by means of an appliance for cooking food under pressure, the appliance comprising:

a bowl and a lid designed to be mounted on the bowl to form a leaktight cooking enclosure;

a temperature sensor; and

a pressure-regulating valve that is sensitive to the
5 pressure prevailing inside the cooking enclosure and that
is mounted to move between two stable abutment positions,
namely a first position in which it shuts off
communication from the enclosure to the outside so long
as the internal pressure is lower than a predetermined
10 pressure P_0 , and a second position in which it puts the
inside of the enclosure into communication with the
outside via a steam outlet once the internal pressure
reaches substantially the predetermined pressures P_0 ;

said appliance being characterized in that the
15 temperature sensor is disposed in the vicinity of the
outlet so as to make it possible to sense the increase in
temperature resulting from the steam passing through the
steam outlet, and is connected functionally to a timer so
as to trigger it once the increase in temperature is
20 sensed.

The objects of the invention are also achieved by
means of a method of monitoring the cooking cycle of a
pressure-cooking appliance, in which method the
temperature of the jet of steam discharged by the
25 pressure-regulating valve of the appliance is used to
trigger automatically a timer mounted on the appliance.

BRIEF DESCRIPTION OF THE DRAWINGS

The objects and advantages of the invention appear
30 in greater detail on reading the following description
with reference to the accompanying drawings which are
given by way of non-limiting illustrative example, and in
which:

Figure 1 is a fragmentary general perspective view
35 of a pressure cooker of the invention;

Figure 2 is a fragmentary perspective view of a detail of an embodiment of a pressure cooker of the invention, including a removable timer;

Figure 3 is a view identical to the view of Figure 2, showing a detail of an embodiment of a pressure cooker of the invention, with the timer removed; and

Figure 4 is a fragmentary cross-section view, showing details of how a temperature sensor can be mounted on the lid of a pressure cooker of the invention.

BEST MANNER OF IMPLEMENTING THE INVENTION

In the following description, reference is made to a household pressure-cooking appliance of the pressure cooker type which, in a manner known per Se, comprises a metal cooking bowl (not shown in the figures) and a lid 2 designed to be mounted on the bowl to form a leaktight cooking enclosure. Leaktightness is obtained by locking the lid 2 to the bowl by means of a locking/unlocking system including an annular sealing gasket (not shown in the figures), thereby enabling the appliance to be brought up to pressure and the food contained in the appliance to be cooked.

The locking/unlocking systems for locking the lid 2 to the bowl and for unlocking said lid from said bowl may be of any known type, without limiting the invention, and may involve a system having a locking bar, a system having ramps on the bowl and on the lid, or else a system having radially-moving jaws or any other equivalent system.

The household pressure-cooking appliances concerned by the invention are thus pressure cookers locked by locking bars, bayonet fittings, jaws that move radially or otherwise, or "manhole-type" locking means, this list naturally being non-limiting.

The appliance of the invention for cooking food under pressure is also provided with a pressure-regulating valve 3 equipped with a sealing gasket 3A and

preferably mounted on the lid 2, such a valve 3 being sensitive to the pressure prevailing in the cooking enclosure and being mounted to move between two stable abutment positions, namely a first position in which it shuts off communication from the enclosure to the outside of the appliance so long as the internal pressure is lower than a predetermined pressure P_0 , and a second position in which it puts the inside of the enclosure into communication with the outside of the appliance via a steam outlet once the internal pressure reaches substantially the predetermined pressure P_0 .

In a preferred variant of the invention, the pressure P_0 is chosen to be the normal cooking pressure of the pressure cooker.

Such devices are well known to the person skilled in the art, and they are designed to regulate the cooking pressure which must be kept below a predetermined threshold P_0 , above which the valve 3 allows steam to escape, thereby regulating the internal pressure of the pressure cooker.

As shown in Figures 1 and 4, for example, the valve 3 may advantageously be a valve loaded by a weight or by a compression spring and mounted to move in a well 4 from a stable abutment position shown in Figure 4, and in which it rests under its own weight on a seat 5 provided through a bore 6 in the lid 2.

The valve 3 may also take up a high abutment position (not shown in the figures) under the effect of the internal operating pressure of the pressure cooker, when said pressure cooker reaches or exceeds the predetermined operating pressure P_0 . In this position, the valve 3 is raised and opens up the orifice 5 through which the steam can escape to the outside through the bore 6 via a steam outlet 7, situated in the immediate or close vicinity of said bore.

As is well known to the person skilled in the art, the valve 3 may be provided with a calibration system

enabling the user to select a predetermined cooking pressure P_0 from a range of two or more pressure levels as a function of the type of food present in the pressure cooker.

5 In the invention, the appliance for cooking food under pressure is provided with a temperature sensor 10 which is disposed in the vicinity of the outlet 7, so as to make it possible to sense the increase in temperature resulting from steam passing through the steam outlet 7.

10 This configuration makes it possible for information to be obtained particularly simply and reliably in real time indicating when the operating pressure, e.g. the cooking pressure, of the appliance is reached, since when the valve 3 lifts the steam is given off suddenly,
15 causing the temperature also to rise suddenly and rapidly.

 The temperature sensor 10 may be disposed in the immediate vicinity of the outlet 7 or at some distance, e.g. about a few centimeters, therefrom provided that the
20 variation in temperature can be detected with sufficient clarity and sensitivity. The positioning distance may also advantageously be determined the person skilled in the art as a function of the sensitivity specific to the sensor 10 used.

25 As shown in the figures, the temperature sensor 10 is advantageously connected functionally to a timer 11 so as to trigger it once the increase in temperature has been sensed.

 By means of this configuration, counting down the
30 cooking time is then triggered automatically, without any action on the part of the user.

 The sensor 10 used may advantageously be a negative temperature coefficient (NTC) type sensor functionally connected to the timer 11 via a suitable connection 12
35 and via processing electronics.

Advantageously, and as shown in the figures, the timer 11 and the temperature sensor 10 are mounted on the lid 2 of the pressure cooker.

By way of a variant, it is naturally possible to consider positioning these two elements directly on or through the walls of the bowl, by means of a suitable fitting, or fixing them to the bowl by means of the handles of the pressure cooker.

Advantageously, as shown in Figures 1 and 4, the steam outlet is formed by a duct 13 starting downstream from the valve 3 in the vicinity of the outlet 7 and leading to the outside of the appliance.

In this configuration, the temperature sensor 10 is mounted on the outside of the duct 13, e.g. in abutment against the outside surfaces of the walls of the duct 13. However, the sensor 10 may be mounted inside the duct 13 (Figure 1).

In a particularly advantageous manner, the duct 13 and the temperature sensor 10 may be pre-fitted and be part of a one-piece unit directly integrated in a plate 15 designed to be put in place on the lid 2.

According to another characteristic of the invention, the timer 11 is advantageously a removable timer that users can thus extract from the pressure cooker in order to keep it nearby.

This feature makes it possible, once the timer 11 has been triggered automatically by means of the sensor 10 disposed in the pressure-regulating heat jet, for the user to extract the timer 11 and to monitor the progress of cooking time away from the appliance. At the same time, this enables the user to adjust the cooking parameters once the predetermined cooking pressure has been reached, while also retrieving the timer 11.

Advantageously, the pressure cooker is provided with a recess 16 for receiving the timer 11. In a variant, the recess 16 may also be provided in an independent plate 15.

The timer 11 is provided with a liquid crystal display (LCD) screen 17 for displaying information, in particular concerning temperatures and times, and with buttons 18 for setting various parameters, such as
5 cooking time, for example.

The timer 11 is also provided with female connectors (not shown) serving to come into contact with male connectors 20 connected to the connection 12 and disposed in the recess 16 for establishing electrical connection
10 with the sensor 10.

By way of a variant, the temperature sensor 10 may be connected to a unit other than a timer, and, for example, to a safety device, indicating, e.g. by sound, that a critical predetermined pressure or a critical
15 predetermined temperature has been reached.

For operating purposes, the user locks the lid 2 on the bowl, and initiates the timer 11 by putting it in its alert position so that it can detect any rise in temperature.

20 When the timer is a conventional timer, the triggering threshold of the temperature sensor may, for example, be pre-set in the factory to a temperature of about 50°C, above which the sensor 10 sends a time count-down signal to the timer 11.

25 Once the timer 11 is in the alert position and once the pressure cooker is locked, temperature can begin to rise. Once the predetermined operating temperature for cooking is reached, the valve 3 discharges a jet of steam, thereby causing the temperature in the duct 13 to
30 increase suddenly, the resulting increase in temperature being detected by the sensor 10. The sensor sends a temperature detection signal to the timer 11 which emits a signal, e.g. a sound signal, warning the user.

The user can then remove the timer 11, perform any
35 operations, such as stopping the alarm, entering the required cooking time if the user has not already entered it into the timer, or changing the cooking time entered

previously, etc., while taking the timer 11 away from the cooking appliance.

Subsequently, once the final cooking time pre-set by the user is reached, said user is warned again by the timer emitting a sound signal and/or by a flashing signal on the digital display 17.

Parameterizing the temperature detection may advantageously be improved by means of logic providing, for safety reasons, detection of a lower temperature threshold of 45°C, the logic containing the information necessary for systematically adding a constant value of 5°C, for example, to the measured temperature value, so as to be certain to detect the temperature of 50°C which can then be validated by the user if desired, thereby triggering the timing count down.

In the same way, an upper temperature limit value, e.g. of about 75°C, may be pre-programmed to form a maximum threshold temperature above which the time count down is always validated and triggered.

The device of the invention therefore enables the beginning of cooking in a pressure cooker to be detected particularly reliably and safely, and independently of the pressure prevailing in the cooking enclosure.

The invention thus relates to a method of monitoring the cooking cycle of a pressure-cooking appliance of the pressure cooker type, optionally provided directly with heater elements, in which method the temperature of the jet of steam discharged from the pressure-regulating valve of the appliance is used to trigger a timer mounted on the appliance. The temperature of the jet of steam is used by using a suitable temperature sensor to detect the sudden rise in temperature that is generated by the steam suddenly being discharged once the operating pressure of the appliance is reached.

Simultaneously, or substantially simultaneously to triggering of the timer, said timer emits a warning signal, e.g. a light signal, a sound signal, or some

other signal, for the purpose of warning the user that it has been triggered.

5 In the method of the invention for monitoring the cooking cycle, since the timer is removably mounted on the cooking appliance, said timer is dissociated or separated physically from the appliance, and the progress of the cooking is then monitored remotely from the appliance by consulting the timer, in particular visually.

10 By mounting the timer removably it is possible for the user to take the timer away as soon as or after it is triggered, and therefore to move away from the cooking appliance while said appliance is operating. This enables the user to monitor and to check the progress of
15 the cooking remotely while in a location that is entirely separate from the appliance.

In this method, the timer then emits a warning signal indicating that the cooking cycle has finished, thereby enabling the user, who might be remote from the
20 appliance, to return to it in order to stop the cooking, for example.

SUSCEPTIBILITY OF INDUSTRIAL APPLICATION

25 The invention can be applied industrially to manufacturing and designing pressure-cooking appliances.